

APPENDIX

OLD CLAIMS WITH HAND-WRITTEN AMENDMENTS

43.

A thermoforming apparatus comprising:

a thermoforming machine fitted with at least one female die; and

extraction pick-up means adapted to withdraw a thermoformed article from the female die and to transfer it to a receiving station, said extraction pick-up means including a receiving ^{SEAT} ~~hole~~ for each thermoformed article to be extracted, ~~each receiving hole being defined along its depth by two annular surfaces reamed in opposite directions and defining between them an equatorial shoulder for engaging and positioning each thermoformed article,~~

wherein the thermoforming machine is fitted with at least one counter-die, the at least one female die and counter-die being reciprocally approachable and removable for the operations of closing, thermoforming and opening,

the apparatus further comprising a feeder for feeding thermoforming material between each female die and counter-die, and

wherein the receiving station is a receiving conveying template including retention surfaces adapted to engage each thermoformed article, at least one surface of said retention surfaces being defined by at least a portion of a wall of a cavity in an element associated with the conveying template, the cavity communicating with at least one exterior surface of the element and having an interior dimension which is smallest in a region remote from said exterior surface to define a shoulder thereat for resiliently holding a thermoformed article disposed in the cavity.

~~44. An apparatus as claimed in claim 1.~~

~~wherein the thermoformed articles have rims and wherein the equatorial shoulder includes a slightly undercut, internal angle of incidence, in order to allow insertion by the thrust of a rimmed thermoformed article and enable it to be resiliently constrained and held firmly in position at its rim.~~

~~3. A thermoforming apparatus as claimed in claim 44, further comprising a carousel conveyor with a plurality of bearing arms and associated conveying templates, each conveying template being fitted with said equatorial shoulder for the retention of the~~

~~thermoformed articles in correct orientation while they are being conveyed, stepwise and synchronously with the opening-closing rate of the dies, through at least one work and/or treatment station positioned around the carousel conveyor.~~

~~4. An apparatus as claimed in claim 43, wherein the thermoformed articles have rims and wherein the equatorial shoulder includes a slightly undercut, internal angle of incidence, in order to allow insertion by the thrust of a rimmed thermoformed article and enable it to be resiliently constrained and held firmly in position at its rim.~~

5. A thermoforming apparatus as claimed in claim 43, further comprising:

a chain conveyor wound by a pair of chain wheels and having a run thereof extending along the respective die or counter-die but beyond the encumbrance thereof; and

wherein said extraction pick-up means comprises a plurality of extraction plates carried at predetermined intervals from each other on said conveyor, each extraction plate being fitted with ~~said~~ receiving holes with equatorial shoulders for retaining the thermoformed articles in proper orientation during their conveyance.

6. A thermoforming apparatus as claimed in claim 43, further comprising a template conveyor extending through at least one work and/or treatment station and moving stepwise at the opening-closure rate of the dies for receiving thermoformed articles from an extraction plate associated with said extraction pick-up means, said extraction plate withdrawing a thermoformed article from the female die and transferring it to said conveying template, said template conveyor conveying the thermoformed articles in sequence to said at least one work and/or treatment station along the template conveyor.

7. A thermoforming apparatus as claimed in claim 6, wherein said template conveyor comprises two alternate movable conveying templates, so that one of said conveying templates is moved laterally, in relation to the female die, at said at least one work and/or treatment station, while the other conveying template is in front of it to receive a thermoformed article from the extraction plate.

8. A thermoforming apparatus as claimed in claim 6, wherein said template conveyor is a chain conveyor which comprises a pair of chain wheels around which a respective chain is wound, a plurality of said conveying templates carried, spaced at a predetermined distance from each other, on said chain conveyor and each fitted with ~~[said]~~ equatorial shoulders retaining the thermoformed articles in proper orientation during their conveyance.

9. A thermoforming apparatus as claimed in claim 6, wherein said template conveyor comprises a train of articulated bearing slides or carriages for a respective conveying template moving through said at least one work and/or treatment station.

10. A thermoforming apparatus as claimed in claim 43, further including a truncated conical collar seated in each receiving hole for precise location of a respective thermoformed article on a surface of the conveying template.

11. A thermoforming apparatus as claimed in claim 10, wherein said collar is constituted of resiliently deformable material suitable for exercising retentive pressure on the external surface of a thermoformed article.

12. A thermoforming apparatus as claimed in claim 10, wherein said collar comprises a plurality of resiliently loaded ratchets, installed in said collar and movable towards its internal diameter for engaging with the external surface of a thermoformed article in a respective receiving seat in said receiving hole.

13. A thermoforming apparatus as claimed in claim 10, wherein said collar comprises suction orifices which exert on the thermoformed article a suction to hold it in proper orientation in its respective receiving hole and with its rim abutting against the template.

14. A thermoforming apparatus as claimed in claim 10, wherein the thermoformed articles have rims and wherein said conveying template has a peripheral recess formed on the surface of the template about the receiving hole for engaging the rim of a thermoformed article received in the receiving hole.

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15. A thermoforming apparatus as claimed in claim 6, wherein the thermoformed articles have rims and wherein said conveying template includes a two-diameter adaptor collar installable in a receiving seat of an opening in said conveying template, said adaptor collar providing said receiving hole in said conveying template and having an internal diameter delimited by a tapered upper section, an undercut intermediate section, ^{AND} ~~an~~ annular shoulder downstream of the undercut section, for receiving a thermoformed article and snap-engage its rim at said undercut section.

16. A thermoforming apparatus as claimed in claim 6, wherein the thermoformed articles have rims and wherein said receiving holes have a slightly smaller internal dimension than the external dimension of the thermoformed articles adjacent their rims to be received, so that the thermoformed article is resiliently constrained and properly oriented in the respective receiving hole.

17. A thermoforming apparatus as claimed in claim 6, further including eccentric mechanical arrests, each of which is fitted at a respective receiving hole of a conveying template and is movable between an operating position in which it engages the rim of a flanged thermoformed article and an inoperative releasing position.

18. A thermoforming apparatus as claimed in claim 17, wherein said arrests are controlled by a rack operated by a motion source.

19. A thermoforming apparatus as claimed in claim 6, further including air jets for sinking each of the articles into the receiving holes.

20. A thermoforming apparatus as claimed in claim 6, further including a cup-shaped receiving component for a thermoformed article, the cup-shaped component being disposed adjacent at least one of said receiving holes and having at least one orifice in a bottom of the cup-shaped component.

21. A thermoforming apparatus as claimed in claim 20, further comprising a push rod for expelling the thermoformed article from the cup-shaped component by acting

through said at least one orifice in the bottom of the cup-shaped component.

~~22. A thermoforming apparatus as claimed in claim 43, wherein the thermoformed articles have rims and wherein said receiving hole has a support shoulder for shallow, thermoformed articles arranged between each receiving hole, said equatorial shoulder including an annular projection which engages the internal diameter of the rim of the article.~~

23. A thermoforming apparatus as claimed in claim 6, wherein said template conveyor includes a plurality of conveying templates and wherein said retention means comprises a push-rod which rises from a surface of each conveying template.

~~24. A thermoforming apparatus as claimed in claim 6, wherein the thermoformed articles have rims and wherein said receiving hole includes at least one annular recess for receiving the rim of one of said thermoformed articles, the rim thereof, when received in said annular recess, abutting a movable push rod provided for removal of the article.~~

25. A thermoforming apparatus comprising at least one female die and counter-die reciprocally approachable and moveable for the operations of closing, thermoforming and opening, a feeder apparatus adapted for feeding thermoforming material between each female die and counter-die, and an extraction pick-up apparatus adapted to withdraw at least one thermoformed article from the female die and to transfer said at least one thermoformed article to a receiving conveying template, the receiving template including [a] retention surfaces adapted to engage each thermoformed article, at least one retention surface of said retention surfaces being defined by at least a portion of a wall of a cavity in an element associated with the receiving conveying template, the cavity communicating with at least one exterior surface of the element and having an interior dimension which is smallest in a region remote from said exterior surface to define a shoulder thereat for resiliently holding a thermoformed article disposed in the cavity.

26. The thermoforming apparatus of claim 25 wherein the element is a plate and has

two exterior surfaces disposed essentially parallel to each other, the cavity communicating with both exterior surfaces.

27. The thermoforming apparatus of claim 25 wherein the wall of the cavity is defined by two annular inclined surfaces which intersect each other at said shoulder.

28. The thermoforming apparatus of claim 27 wherein the two annular surfaces intersect each other at a plane which is disposed perpendicular to an axis of the cavity.

29. The thermoforming apparatus of claim 28 wherein the thermoformed article has a rim and wherein the shoulder is defined where the two annular surfaces intersect each other, the shoulder having a slightly undercut, internal angle of incidence, in order to allow insertion by the thrust of a rimmed thermoformed article and to enable the rimmed thermoformed article to be resiliently constrained and held firmly in position at its rim.

30. The thermoforming apparatus of claim 25 wherein the thermoformed article has a rim and wherein the shoulder has a slightly undercut, internal angle of incidence, in order to allow insertion by the thrust of a rimmed thermoformed article and to enable the rimmed thermoformed article to be resiliently constrained and held firmly in position at its rim.